Stellingen behorende bij het proefschrift

The evolutionary ecology of mutualism

door

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1. Three common species of root aphids farmed by the ant *Lasius flavus* are characterised by clonal reproduction, rare dispersal and (genetic) monocultures at the lowest spatial scale. Such a combination of symbiont characteristics is commonly found in farming mutualisms and likely constitutes a general set of necessary conditions for the evolutionary stability of these systems.
   This thesis, Chapters 1, 2, 3, 4 and 8; *e.g.* Poulsen & Boomsma 2005 *Science*; Aanen *et al.* 2009 *Science*

2. 'Cattle farming' by the ant *L. flavus* can be considered 'niche construction', since the 'in-house' availability of cattle-provided sugars and proteins allows for an exceptionally high density of this species in salt-marsh habitats; this domestication process can thus be considered analogous to the dramatic increase in human population densities after our ancestor's cultural transition to a farming lifestyle.
   This thesis, Chapter 4; Larsen 1995 *Ann. Rev. Antropology*; Laland & Boogert 2010 *Ecol. Economics*

3. Despite the importance of partner choice for the stability of many mutualisms, the low aphid diversity observed in *L. flavus* mounds can more parsimoniously be attributed to passive mechanisms of dispersal and local asexual reproduction in the root aphids rather than to active choice by the ants.
   This thesis, Chapters 2, 4, 7 and Box A

4. Choosing to stick with cooperative partners does not automatically lead to the evolution of more cooperation.
   This thesis, Chapters 6 and 7

5. Models involving conditional strategies can yield counter-intuitive results and novel 'out-of-the-box' insights, which can give rise to future research avenues of explicit hypothesis testing.
   This thesis, Chapters 6 and 7

6. Low cost-benefit ratios and asymmetry in cooperative investments are key ingredients for successful mutualism.
   This thesis, Chapters 7, 8

7. Up to 9.5 million tons of food is wasted in The Netherlands annually; this is largely because little value is given to food throughout the complete food chain. Therefore, an important lesson remains to be learned from yellow meadow ants: "*De* [*L. flavus*] *mieren kennen er* [*het vee*] *de waarde van, het is hun schat*" (In: "De wijsheid der mieren" by Prof. F.J.J. Buytendijk, 1922).
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8. Parallel study of multiple study systems is needed to identify general patterns in biology. However, conducting a classical, descriptive study can be a handicap to (young) scientists developing novel study systems in evolutionary ecology, since the highest ranking journals prefer studies involving fancy new research technology. Yet, basic descriptive studies of a system's biology are indispensable for making the application of these techniques to novel study systems worthwhile for between-system comparison.

9. PhD curricula could be better adapted to the future careers of the students following them, because they appear mostly designed to prepare students for a career in science, while >30% of the students pursue a career outside academia directly after completion of their PhD.
   Sonneveld *et al.* 2010, IVLOS, Larsen & Lubbe 2008, VSNU

10. People who say 'yes' are rewarded by the adventures they have; people who say 'no' are rewarded by the safety they attain.
    "Impro" by K. Johnstone, 1979